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ABSTRACT

This document consists of a sample curriculum model for grade 5 mathematics based on the 1998 Arkansas State Mathematics Framework. The document is divided into five sections: (1) Number Sense, Properties, and Operations; (2) Geometry and Spatial Sense; (3) Measurement; (4) Data Analysis, Statistics, and Probability; and (5) Patterns, Algebra, and Function. Within each section the standards are exemplified and articulated by benchmarks, suggested assessments, and possible strategies and activities for teaching the standard. (MM)

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SAMPLE CURRICULUM MODEL

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Grade 5

based on the 1998 Arkansas State Mathematics Framework
Arkansas Department of Education, 1998

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Grade Level_5_
NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.1.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.1.1 Identify numerical patterns (e.g., prime numbers, squares, exponents) and verify results (e.g., by continuing the pattern).	Students will identify numerical patterns with one variable such as square numbers (e.g., find the next three numbers in this pattern: 9, 16, 25, ___, ___, ___) and will develop the concepts of integers through the use of coordinate planes.	. Teacher made test . State-wide tests . Perform-ance . Writing	. After instruction on numerical patterns, each student is given an index card. The student records a self-generated pattern on the card. The students then exchange cards and attempt to extend the other person's pattern. If an extension can be made, the student records the pattern, in words, on the back of the card. . Using masking tape, construct a coordinate plane on the floor of the classroom. The students then describe the location of their desks in relationship to the strips of tape. . Refer to: Number Ideas through Pictures by Charosh, Mannis; Number Patterns Make Sense, A Wise Owl Book by Fehr, Howard

Grade Level_5_

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.1.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.1.2 Expand number sense through the use of mental computation, calculators/ technology, and written and verbal communication (e.g., powers of ten, factoring, greatest common factors, least common multiples).	Students will expand number sense by: understanding and using compatible numbers (e.g., 6 and 4 are 10 therefore 36 + 14 = 50 is computed mentally); rounding to the nearest tenth in a decimal based on the context of the problem; recognizing fractions equivalent to common fractions (e.g., 5/15 = 1/3); finding the multiples of a number; using estimation techniques to estimate sums and differences of decimals; solving word problems using calculators/technology as learning tools (e.g., explore patterns of fractions using calculators with fraction capabilities such as a scientific calculator); oral and/or written communication of reasoning for results of computations; use a scoring guide to perform self-evaluation.	. State-wide . Writing . Perform-ance . Teacher made test	. Each student is provided with a set of fraction strips. The students then sort through the strips matching the strips with the same amount of space shaded. The fractions for each sorted set are then recorded, thus showing equivalent fractions. The students investigate ways to recognize equivalent fractions without the use of fraction strips. . Given a problem to compute or estimate, the student records and reports two or more methods/rationales for solving the problem. . Read: Alexander Who Used to be Rich Last Sunday by Viorst, Judith.

Grade Level_5_

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.1.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.1.3 Represent numbers and operations in a variety of equivalent forms (including models, tree diagrams, and symbols).	Students will: represent operations using models (i.e., arrays with base ten blocks for multiplication and division of whole numbers to illustrate the distributive property of multiplication over addition, etc.); multiply a 3-digit whole number by a 2-digit number; divide whole numbers by 2-digit divisors; use manipulatives to represent fractions (i.e., continuous wholes, equivalent fractions, and discrete sets with fraction bars, attribute blocks, fraction strips, etc.) (e.g., $\frac{1}{2}$ of a cake and $\frac{1}{2}$ of a dozen eggs).	. Teacher made test . Writing . State-wide tests . Perform-ance	. Students are asked to represent a whole number using base ten blocks on a hundreds grid. The students then relate what they see on the paper that equals the whole number. Example: The students represent the number 26. Some use 2 tens and 6 units. Others may use 26 units. Depending on how they arranged these on the grid, some may see that 13+13=26. Some may see that 26>25.
SLE NPO.1.4 Consistently demonstrate competence with rational number computations (add, subtract, multiply, and divide) with and without manipulatives and technology.	Students will: add and subtract fractions and/or mixed numbers with and without like denominators using manipulatives; multiply a whole number by a fraction; divide numbers with a decimal in the dividend (e.g., $4.25 ÷ 5 = $0.85); use appropriate software technology to demonstrate competence with rational number computations.	. State-wide tests . Perform-ance . Demon-stration . Teacher made tests	. Students use fraction circles or pattern blocks to add and subtract fractions and/or mixed numbers.

Grade Level 5

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.1.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.1.5 Communicate knowledge of elementary number theory concepts (e.g., primes, factors, multiples, divisibility rules) through classroom interaction and written responses (e.g., tests, journals).	**Students will communicate knowledge of: place value to the nearest tenth in a decimal; divisibility rules for 2, 5, and 10; multiples through classroom interaction (e.g., performance assessments, response to verbal questions, etc.) and written responses (e.g., response to open-ended questions, journals, etc.); use a scoring guide to perform self-evaluations.**	. Teacher made tests . Writing . State-wide tests . Exhibi-tion	. Students locate the multiples of 2 on a hundreds chart. The multiples are recorded and a pattern is determined. The pattern is used to develop the divisibility rule for 2. The process and rationale for the divisibility rule is recorded in their math journals. Repeat the activity for 5 and 10.
SLE NPO.1.6 Identify, with/without the aid of technology, irrational numbers and locate irrational numbers relative to other numbers (e.g., the square root of 2 is between 1 and 2, pi is between 3 and 4).	N/A		N/A

Grade Level_5_

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.2.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.2.1 Use estimation to check the reasonableness of computation in application problems.	**Students will use rounding and other estimation techniques to estimate: sums, differences, products and quotients of whole numbers and fractions; sums and differences of decimals to check the reasonableness of computation in application problems.**	**. Teacher made test . Performance . Statewide test . Writing**	**. Extend NPO.1.4 to have the students estimate the sum and difference of the fractions before calculating.**
SLE NPO.2.2 Develop strategies for comparing quantities using ratios and proportions (e.g., fractions, rates, unit rates, percents, scales) with use of manipulatives and technology.	**Students will develop strategies for comparing quantities using ratios and express ratios as fractions in simplest form with the use of manipulatives and technology.**	**. Teacher made tests . Teacher observation . Demonstration . Statewide test**	**. Each student is given a package of colored candy (such as M&M's and Skittles). The students determine the ratio of each color to the whole package. The ratio is written in various formats and is simplified, if possible, when written as a fraction.**

Grade Level 5

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.2.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.2.3 Determine the most appropriate notational representation of a number for the given problem (e.g., fractions vs. decimals, scientific notation).	Students will determine the most appropriate notational representation of a number for the given problem (e.g., common fractions vs. common decimals vs. common percents, rounding to significant digit, etc.	. Teacher observation . Peer and self evaluation . Anecdotal records . Statewide test	. Each student is given a card with a real-life situation recorded on it. The student must decide which notational representation is most appropriate in the given situation.
SLE NPO.2.4 Explain the relationship of numbers in one- and two-dimensional graphs (e.g., number lines and coordinate graphs), with and without appropriate technology such as graphing calculators.	Students will explain the relationship of numbers on number lines with positive numbers and common fractions, coordinate graphs with positive numbers, line graphs, and bar graphs with and without appropriate technology such as graphing calculators.	. Appropriate response to teacher direct questions . Verbal explanation . Teacher observation . Peer and self evaluation . Statewide test	. Students are given a number line with 0 and one other point identified. They locate another specified point on the number line using only the identified points. For example: The number line has the points 0 and 3/4 identified. The students are asked to show the point where 1 is located.

Grade Level 5

NUMBER SENSE, PROPERTIES, AND OPERATIONS

Standard NPO.2.0	Benchmarks	Assessments	Strategies/Activities
SLE NPO.2.5 Communicate using appropriate vocabulary as it relates to the real number system in real-world situations (e.g., integers, whole, rational, irrational, natural/counting, etc.).	**Students will communicate in written or verbal form using appropriate vocabulary as it relates to the real number system in real-world situations (e.g., whole, natural/counting, etc.); use a scoring guide to perform self-evaluations.**	. Teacher made test . State-wide tests . Writing . Portfolio	. Extend NPO.2.2, GS.1.2, and GS.2.1 to have the students communicate their results in verbal and written forms.

Grade Level 5

GEOMETRY AND SPATIAL SENSE

Standard GS.1.0	Benchmarks	Assessments	Strategies/Activities
SLE GS.1.1 Identify, draw, classify, and compare geometric figures and their relationships in one, two, and three dimensions (from points to *polyhedra*) with physical materials.	Students will identify, draw, classify, and compare geometric figures and their relationships in one, two, and three dimensions (e.g., parallel lines, perpendicular lines, angles, basic polygons by number of sides, rectangular solid, etc.) with physical materials.	. Teacher made test . Performance . State-wide test . Writing	. Given examples/drawings that are parallelograms alongside examples/drawings that are non-parallelograms, students determine what makes a parallelogram. The generated criteria are recorded on chart paper to be further developed into a formal definition. (Repeat with other polygons.) . Refer to: Ed Emberley's Big Orange Drawing Book by Emberley, Ed.
SLE GS.1.2 Apply geometric properties and formulas (e.g., triangles have 180 degrees, opposite sides of rectangles are equal, Pythagorean theorem) to solve problems with and without appropriate technologies.	Students will apply geometric properties and formulas (e.g., triangles have 180 degrees, circles have 360 degrees, acute angle/triangle, right angle/triangle, obtuse angle/triangle, etc.) to solve problems with and without appropriate technologies.	. Writing . Performance . Improved vocabulary . State-wide test . Demonstration	. A pizza party is given. Before the students are allowed to have a slice of pizza they must determine the angle measure of the point of the pizza slice. Students then add all of the answers to develop the property of circles having 360 degrees. (Fraction circles may also be used.)

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GEOMETRY AND SPATIAL SENSE

Standard GS.1.0	Benchmarks	Assessments	Strategies/Activities
SLE GS.1.3 Make predictions based on transformations of geometric figures in problem-solving situations (e.g., compare 2 pictures and determine what changes were made, i.e. flip, slide, rotation).	Students will make predictions based on transformations (reflections, translations, and rotations) of geometric figures on the coordinate plane (negative and positive numbers) in problem-solving situations (e.g., mimicking a route at a different location, tessallations, etc.)	. Exihibition . Log . Teacher made test . State-wide test	. Students are given the coordinates of a quadrilateral. The students plot the ordered pairs on a coordinate plane. The students then connect the points in the order plotted so that the quadrilateral is drawn. They then form new coordinates by performing the addition operation to each number of the original ordered pair. They plot the new set of coordinates as done previously. This is repeated by having the students add or subtract an amount from one of the numbers in the original ordered pairs and connecting the points as they are plotted. The students describe the changes in the original quadrilateral to the transformed quadrilateral in their log. An extension would consist of the students writing the opposite (the opposite of +5 would be -5) of one of the numbers in the original ordered pairs and plotting the newly formed coordinates.

Grade Level 5

GEOMETRY AND SPATIAL SENSE

Standard 6S.1.0	Benchmarks	Assessments	Strategies/Activities
SLE 6S.1.4 Establish and apply geometric relationships through informal reasoning (e.g., estimate angle measures).	Students will establish and apply geometric relationships through informal reasoning (e.g., estimate angle measures).	. Teacher observation . Teacher made test . Demonst-ration . State-wide test	. Students are provided with cut outs of 30-60-90 degree and 45-45-90 degree triangles (angle measures are labeled on the provided triangles). The students estimate various angle measures by using combinations of the vertices (angles) on the provided triangles as benchmark angles (estimating tools).

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GEOMETRY AND SPATIAL SENSE

Standard GS.1.0	Benchmarks	Assessments	Strategies/Activities
SLE GS.1.5 Visualize, model, and represent 3 dimensional objects (e.g., cube models, base plans/nets, building plans, isometric dot paper sketches) to develop and implement problem-solving strategies and verify solutions.	**Students will visualize, model and represent 3 dimensional objects (e.g., determining the perimeter of various cubic containers and solids with and without the same base and height) to develop and implement problem-solving strategies and verify solutions.**	. Exhibition . Teacher made test . Project . State-wide test	. Students determine the minimum amount of ribbon needed to go around a variety of containers. . Refer to: Messing Around with Drinking Straw Construction

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GEOMETRY AND SPATIAL SENSE

Standard GS.2.0	Benchmarks	Assessments	Strategies/Activities
SLE GS.2.1 Construct geometric models to solve problems (e.g., comparing bridge supports: cylindrical vs. rectangular).	Students will construct geometric models to solve problems (e.g., determining linear measure such as perimeter of various size shipping boxes).	. Teacher made test . Exhibition . State-wide test . Demonstration	. Given a length of ribbon, the students design the largest size box that the ribbon will go around (both length and width) with no excess ribbon.
SLE GS.2.2 Investigate geometric properties and use them to describe and explain situations in society and nature (e.g., why doors are rectangular, why honeycombs are hexagonal, why trusses are triangular).	Students will investigate geometric properties and use them to describe and explain tessellations in society and nature (e.g., wall paper patterns, floor tiles, honeycombs, etc.)	. Teacher made test . State-wide test . Writing . Project	. Students will locate and draw examples of tessellations in society or nature and will explain orally and in writing how the shape will tessellate. . Read: A Cloak for the Dreamer by Friedman, A.; Sam Johnson and the Blue Ribbon Quilt

Grade Level 5

MEASUREMENT

Standard M.1.0	Benchmarks	Assessments	Strategies/Activities
SLE M.1.1 Use estimation to check the reasonableness of measurements obtained from use of various instruments (including angle measures).	Students will estimate before measuring (length to the nearest foot, inch, meter, and centimeter; time to the nearest minute; weight to the nearest pound; mass to the nearest kilogram; liquid capacity to the nearest liter/cubic decimeter and cup) with appropriate tools to check for reasonableness of measurement.	. Teacher observation . Teacher made test . State-wide test . Perform-ance	. Extend GS.2.1 to include having the students estimate the length of the ribbon before determining the perimeter. Then have the students estimate the capacity of the box. . Students estimate the amount of time it would take for them to run a hundred meters. The students pair up, run the hundred meters, and measure the time. . Students derive the conversions of liquid measure within a system by estimating the amount and then conducting activities to check for reasonableness of the estimation. . Read: Capacity by Pluckrose, Henry; The Time Book by Cassidy, John
SLE M.1.2 Estimate, calculate, and compare the one, two, and three dimensional features of objects in metric, customary and non-standard units of measure.	Students will estimate, calculate and compare the perimeter of objects in metric, customary (U.S. Standard) and non-standard units of measure.	. Teacher observation . Perform-ance . Teacher made test . State-wide test	. Extend GS.2.1 and M.1.1 to include metric as well as customary units of measure.

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MEASUREMENT

Standard M.1.0	Benchmarks	Assessments	Strategies/Activities
SLE M.1.3 Convert from one measurement to another within the same system (customary or metric).	Students will convert, through investigations, volume measurements (e.g., fluid ounces to cups to pints to quarts to gallons and milliliters to liters) and capacity measurements (e.g., cubic centimeters to cubic decimeters) within the same system; investigate the relationships between cubic decimeters to liters and cubic centimeters to milliliters using appropriate models.	. State-wide tests . Perfor-mance . Teacher made test . Observ-ation	. See M.1.2

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MEASUREMENT

Standard **M.2.0**	Benchmarks	Assessments	Strategies/Activities
SLE **M.2.1** Select appropriate units and tools (metric, customary and non-standard) to measure to the required degree of accuracy.	**Students will choose the appropriate measuring tool (ruler, yard stick, meter stick, clock, weight scale, etc.) and unit (foot, inch, meter, centimeter, minute, pound, kilogram, liter, cup) to measure to the required degree of accuracy.**	. **Teacher made test** . **Project** . **State-wide test** . **Demon-stration**	. **Extend GS.1.5 and GS.1.6 to allow the students to choose the appropriate measuring tool and unit to measure to the required degree of accuracy.**

Grade Level 5

MEASUREMENT

Standard M.3.0	Benchmarks	Assessments	Strategies/Activities
SLE M.3.1 Develop and use procedures to solve measurement problems using one, two, and three dimensions.	Students will develop and use strategies for finding the length of straight and curved lines and the perimeter of two and three dimensional objects.	. Teacher made test . Writing . State-wide test . Demon-stration	. See GS.1.5 and GS.2.1
SLE M.3.2 Using manipulatives and technology, develop the concepts of rate of change (mph, interest, tax rates, commissions, utility rates) and indirect measurements (heights of an object, width of a river).	Students will use manipulatives and technology to develop the concept of rate (e.g., "per", cost per item, etc.) and of rate of change (e.g., rate of speed, etc.).	. Teacher observation . Perform-ance . Teacher made test . State-wide test	. Students plan and act out trips of varying speeds along a straight line track. They develop ways to record the trips, with and without using words, clearly enough so that someone who has not seen the action can describe the trip. Students interpret and critique one another's representations. . Technology connection: Using graphing calculators, CBLs, and motion detectors to act out various graphs.

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MEASUREMENT

Standard M.3.0	Benchmarks	Assessments	Strategies/Activities
SLE M.3.3 Construct scale drawings (using various tools) and/or build 3-D models to represent real-world problems and situations.	N/A		N/A

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DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard DSP.1.0	Benchmarks	Assessments	Strategies/Activities
SLE DSP.1.1 Actively and systematically collect, organize and describe data using technology when appropriate.	**Students will collect categorical or numerical data and organize the data in a sensible way, using technology when appropriate.**	. Performance . State-wide test . Writing . Teacher made test	. In small groups, students generate survey questions that will gather information concerning "favorites". They survey their school mates and organize the resulted data using various methods, such as tally marks/charts. . Read: Statistics by Author Unknown, Illustrated by John Reiss. New York: Thomas Y. Crowell Publishers, 1973.
SLE DSP.1.2 Construct, read and interpret tables, charts and graphs (including stem-and-leaf, histogram, bar graph, pie graph, box and whiskers, line graph, scatter plots) with and without technology.	**Students will construct, read and interpret tables, charts, bar graphs, broken-line graph, and mystery graphs (various graph shapes).**	. State-wide test . Project . Writing . Demonstration	. Extend DSP.1.1 to have students construct a graph to represent the data collected and organized. They read and interpret the graphs made by fellow classmates. They write, in their math journals, new and/or interesting information they gained by reading and interpreting their classmates' graphs and how the information can be used. . Read: Millions of People by John Dunworth and Thomas Drysdale.

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DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard DSP.1.0	Benchmarks	Assessments	Strategies/Activities
SLE DSP.1.3 Based on analysis of central tendencies (mean, median, mode, range) make predictions and inferences (e.g., interpolate from within graphs and extrapolate by extending graphs) from the data set with and without technology.	**Students will determine the maximum and minimum for a set of numerical data; compute the range for a set of numerical data; make predictions and inferences from a set of numerical and categorical data with and without technology.**	**. State-wide test . Demonst-ration . Teacher made test . Writing**	**. Students measure the length of their feet. The maximum, minimum, and range of the length is determined by the students. They predict the average (mean), shortest, and longest length of a foot for their grade level. They check their predictions by repeating the activity in another 5th grade classroom. Students compile the measurements and infer the average (mean), smallest, and longest length of feet for 5th graders. The process and results are recorded in writing.**

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Grade Level 5

DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard DSP.2.0	Benchmarks	Assessment	Strategies/Activities
SLE DSP.2.1 Conduct experiments or simulations, with and without technology, to model situations and construct *sample spaces.*	Students will conduct experiments or simulations, with and without technology, to construct *sample spaces* (e.g., finding all possible outcomes for drawing a colored cube out of a bag).	. Log/ journal . Performance . Project	. Precede NPO.2.2 to have students identify the sample space by listing the possible outcomes (colors).
SLE DSP.2.2 Make predictions based on experimental and theoretical probabilities.	Students will make predictions based on experimental probabilities (e.g., predicting what playing card will be turned up next).	. Statewide test . Writing . Teacher observation . Teacher made test	. Students make a prediction based upon a previously conducted experiment to determine the number of people that would smile at them in passing if the students smiled first. The prediction is tested on a different audience. The process, rationale for prediction, and results of testing the prediction are recorded.

Grade Level 5

DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard DSP.2:0	Benchmarks	Assessment	Strategies/Activities
SLE DSP.2.3 Use a probability model for comparing experimental results with theoretical expectations.	Students will compare experimental results with theoretical expectations (e.g., theoretical expectation for the sum of two rolled dice to be odd or even compared to the experimental results).	. State-wide tests . Writing . Teacher made test	. Student compare the experimental results of rolling a specified numeral on a number cube with the theoretical expectation of rolling that numeral. (For example: The theoretical expectation of rolling a one on a number cube is 1/6. The experimental results may yield a different outcome.) The students record their process for the activity on a card as instructions for conducting the activity, to be used by a different group of individuals.
SLE DSP.2.4 Interpret experimental and theoretical probabilities to determine whether outcomes are equally likely or biased.	Students will interpret experimental results and theoretical expectations to determine which outcome is most likely to occur if the experiment was conducted again.	. State-wide test . Writing . Teacher made test	. Extend DSP.2.3 to have the students determine which outcome would be most likely to occur if the activity was repeated. Students record the determined results in their math journal.

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DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard **DSP.3.0**	Benchmarks	Assessment	Strategies/Activities
SLE **DSP.3.1** Evaluate arguments that are based on statistical data.	**Students will determine the truth or validity of statements made by fellow students based on a set of data.**	. **State-wide tests** . **Writing** . **Teacher made test** . **Perfor-mance**	. **See DSP.1.3, DSP.2.2, and DSP.2.4**
SLE **DSP.3.2** Make inferences and convincing arguments based on statistics with and without technology.	**Students will make valid statements based on a set of data.**	. **Teacher observation** . **State-wide test** . **Teacher made test** . **Demon-stration**	. **See DSP.3.1**

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DATA ANALYSIS, STATISTICS AND PROBABILITY

Standard DSP.3.0	Benchmarks	Assessment	Strategies/Activities
SLE DSP.3.3 Model the use of probability and statistical methods in decision making using technology presentation materials (e.g., LCD, graphing calculators, spreadsheets, etc.).	**Students will model the use of statistical methods in decision making (e.g., making valid decisions based upon experimental data) using appropriate technology for presenting their reasoning and results.**	. Exhibition . Statewide tests . Project . Demonstration	. See DSP.3.1

Grade Level 5

PATTERNS, ALGEBRA AND FUNCTION

Standard PAF.1.0	Benchmarks	Assessments	Strategies/Activities
SLE PAF.1.1 Represent arithmetic as algebra (change 25 = __ + 13 to 25 = m + 13).	Students will represent arithmetic as algebra (change 25=__+13 to 25=m+13).	. Teacher made test . State-wide test . Demon-stration . Perfor-mance	. Given a cut out of a letter (such as v), students substitute the letter for a blank in a simple arithmetic problem. (For example, instead of writing 27+__=44, students write 27+ =44 and place the "v" in the space. When the problem is solved, the answer is written v=17.)
SLE PAF.1.2 Through the use of manipulatives and computer technology, develop the concepts of variables, expressions, and equations (algebra tiles, two color counters, graphing calculators, balance scale model, etc.).	Students will use manipulatives (e.g., balance scale model) and appropriate technology (handheld and computer) to develop the concept of variables.	. State-wide test . Demon-stration . Observ-ation . Log	. See PAF.1.1

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Grade Level 5

PATTERNS, ALGEBRA AND FUNCTION

Standard PAF.1.0	Benchmarks	Assessments	Strategies/Activities
SLE PAF.1.3 Analyze and represent (through calculator use) situations and number patterns with tables, graphs, and equations (e.g., identifying linear, exponential, and quadratic patterns).	Students will analyze and represent, with and without calculator, number patterns with tables.	. Teacher observation . State-wide test . Demon-stration . Exhibit-ion	. Extend NPO.1.1 to have students analyze and represent the number patterns with tables.
SLE PAF.1.4 Summarize and pose problems/situations relating to the algebraic relationships, patterns, and functions, discovered through explorations.	Students will summarize and pose alternate problems/situations relating to patterns discovered through explorations.	. State-wide test . Writing . Portfolio . Teacher made test	. The rhythm of a song is represented by clapping hands and slapping legs. (For example, "Twinkle, Twinkle Little Star" is represented as 2 leg slaps, 2 claps, 2 leg slaps, 1 clap.) The students summarize the pattern and discover another song with the same rhythm ("ABC" song). . Students determine the growing pattern of a series of numbers and summarize the pattern. They pose their own questions concerning the pattern. Questions posed and determined responses are recorded in their math journals.

Grade Level 5

PATTERNS, ALGEBRA AND FUNCTION

Standard PAF.2.0	Benchmarks	Assessments	Strategies/Activities
SLE PAF.2.1 Conduct informal investigations (with technology) for analyzing, representing, interpreting, and generalizing functional relationships (e.g., distance and time) to develop explanations or predictions about outcomes of actual situations.	**Students will conduct informal investigation (with or without technology) to identify unknowns/variables.**	. State-wide test . Performance . Writing . Project	. See NPO.1.2, NPO.2.2, GS.1.4, GS.1.5,GS.2.1, and DSP.2.3
SLE PAF.2.2 Identify variables and relationships and translate them into mathematical statements or other mathematics representations to construct a model (e.g., converting from graphs, tables, words, and expressions).	**Students will identify relationships in patterns and translate them into words or symbols to construct a model (e.g., converting from tables to words).**	. State-wide test . Performance . Writing . Project	. Students are given a situation. They use a table to model the situation. They translate the situation into words. (For example, the students are told that they are given a penny the first day, 2 pennies the second day, 4 pennies the third day, 8 pennies the fourth day. They use a table to record the information and to develop the pattern. They translate the pattern into words and record the pattern, the process for developing the pattern, and the amount that would be received on the 10th day in their journal.

Grade Level 5

PATTERNS, ALGEBRA AND FUNCTION

Standard PAF.2.0	Benchmarks	Assessments	Strategies/Activities
SLE PAF.2.3 Write and solve equations and inequalities (using manipulatives and technology).	N/A		N/A
SLE PAF.2.4 Communicate in written and verbal form a verification of the solution and the process used to obtain the solution.	Students will communicate in written (e.g., journals, open-ended assessments, etc.) and verbal forms the justification of the solutions and the process used to obtain the solution (e.g., "How do you know your solution is the best choice?"); use a scoring guide to perform self-evaluations.	. Portfolio . Writing . State-wide test . Demon-stration	. See PAF.1.1, PAF.1.4 (second activity), PAF.2.2, and PAF.2.5

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PATTERNS, ALGEBRA AND FUNCTIONS

Standard PAF.2.0	Benchmarks	Assessments	Strategies/Activities
SLE PAF.2.5 Use a calculator to display, to determine, and to make inferences from linear relationships in slope-intercept form.	N/A		N/A

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